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Bridger Eocenes. In later epochs it is chiefly seen only in the last superior molar.

It is also evident that the quadritubercular molar is derived from the tritubercular by the addition of a lobe of the inner part of a cingulum of the posterior base of the crown. Transitional states are seen in some of the *Periptychidæ* (*Anisonchus*) and in the sectorials of the *Procyonidæ*.

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*On the Brains of the Eocene Mammalia Phenacodus and Periptychus. By  
E. D. Cope.*

(Read before the American Philosophical Society, December 15, 1882.)

#### PHENACODUS PRIMÆVUS Cope.

A cast of the cranial cavity gives the following as the general characters of the brain. The cerebral hemispheres are remarkably small, each one being less by one-quarter than the cerebellum. They are separated from the latter and from the large olfactory lobes by strong constrictions. The posterior one is occupied by a thick tentorium. In like manner a wide groove for a robust falx separates the hemispheres above, a notch represents the sylvian fissure, and the lobus hippocampi is quite large. The vermis of the cerebellum is quite distinct, and the lateral lobes are large. They are impressed laterally by the petrous bones as in various ruminants. The anterior columns of the medulla are not visible. There are traces of the convolutions on their hemispheres.

The brain displays the following more special features. The olfactory lobes are as wide as long, and they diverge, having two external sides. In section they are triangular, presenting an angle downwards. The hemispheres are depressed, and wider posteriorly. They are well separated from each other and from the cerebellum; so much so that it is quite probable that the copora quadrigemina are exposed. Their outlines are however not distinguishable on the flat surface which connects the hemispheres posteriorly. No further indication of sylvian fissure can be seen in the cast beyond an entering angle defining the lobus hippocampi anteriorly. The latter is prominent externally, and less so downwards. There are distinct indications of convolutions. There are three on each side above the sylvian convolution, and a fourth extends from the sylvian upwards and posteriorly below the posterior part of the third or external convolution. The sulci separating the convolutions are very shallow. The internal and external convolutions unite anteriorly, passing round the extremity of the median convolution. The space between this gyrus and the base of the olfactory lobe is only three millimeters.

The cerebellum is larger than a single hemisphere. Its superior surface is somewhat flattened, and descends forwards; the lateral boundary of this face is a projecting edge which rises behind to an angle of the vermis. The posterior face is shorter than the superior, and is vertical. It is separated by a space from a very prominent lateral convolution, while the region of the flocculus is concave from the internal form of the ascending portion of the petrous bone. This concavity is open anteriorly. The base of the fifth pair of nerves is below its apex, and that of the sixth below the inferior extremity of the lateral convolution. The section of the medulla oblongata is a transverse oval; its inferior face and that of the pons varolii, smooth. A deep fossa just anterior to the bases of the optic nerves.

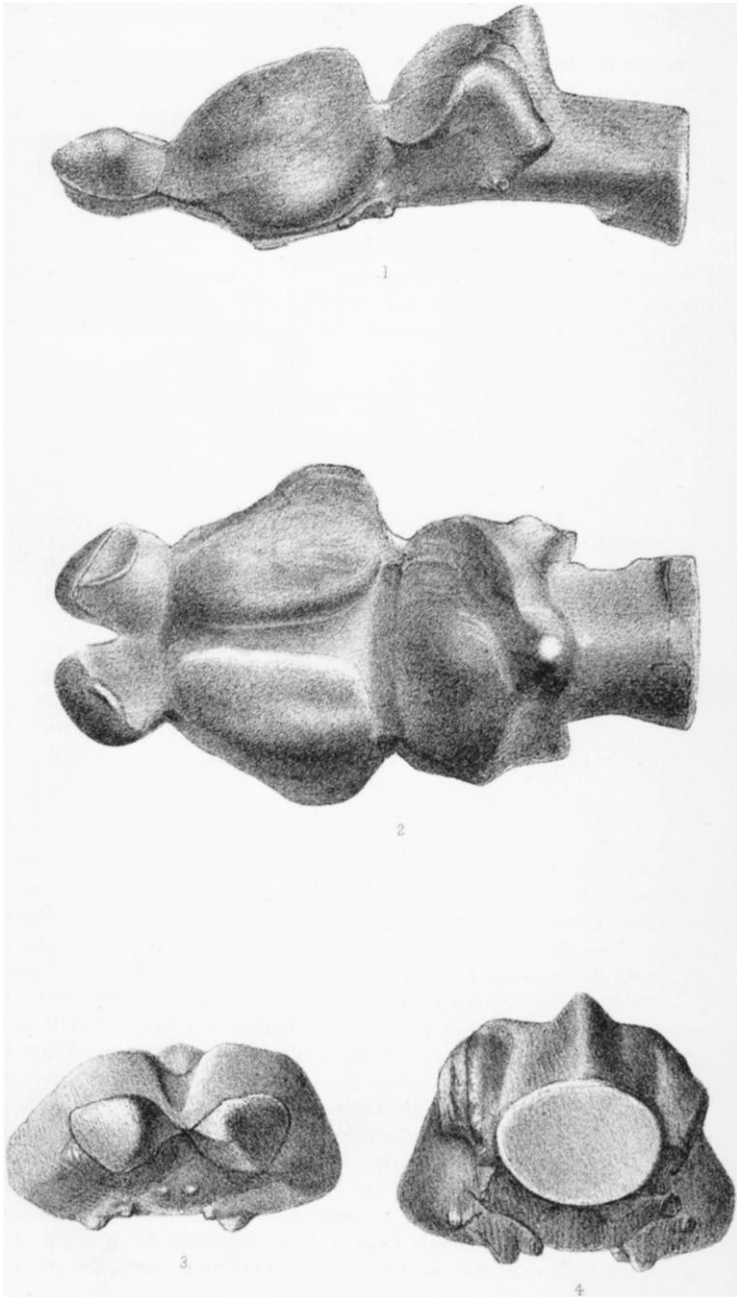
*Measurements of brain.*

M.

Length from vermis to olfactory lobes inclusive.....	.070
“ of olfactory lobes from above.....	.015
“ of hemispheres, from above.....	.030
“ of cerebellum from above.....	.024
Depth of olfactory lobe.....	.010
“ of hemisphere.....	.023
“ of cerebellum and medulla.....	.026
“ of medulla at vermis.....	.015
Width of olfactory lobes at middle.....	.030
“ of hemispheres in front.....	.044
“ “ behind.....	.044
“ of cerebellum.....	.036
“ medulla at vermis.....	.020

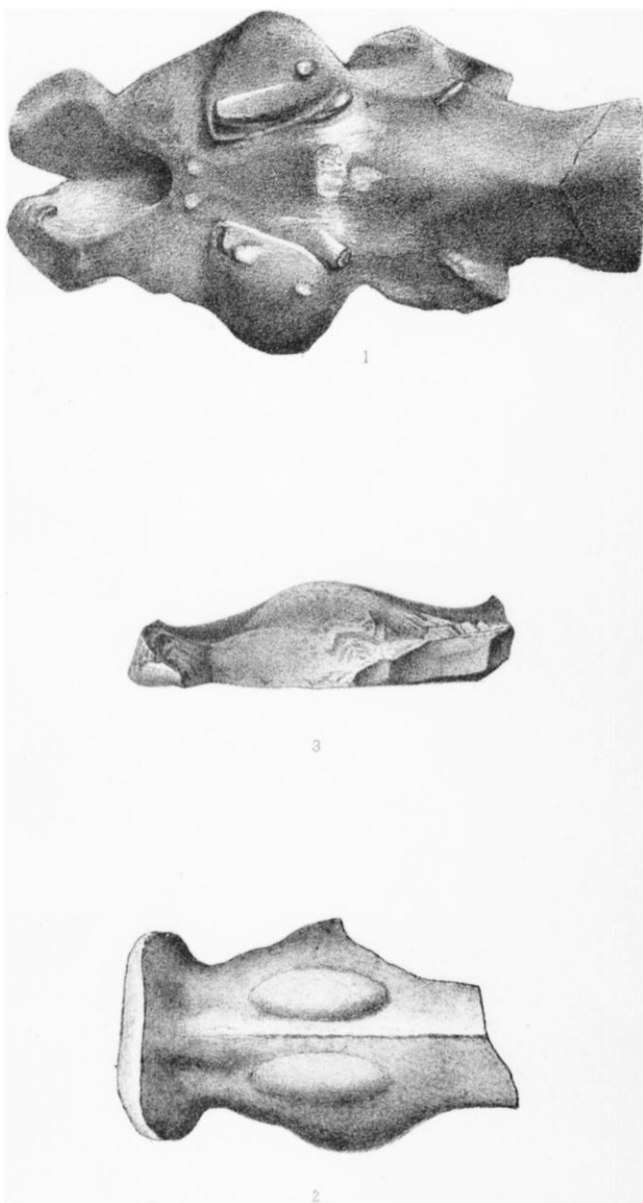
PERIPTYCHUS RHABDODON Cope.

I have obtained a cast of the top and sides of the cerebral hemispheres, and the proximal portion of the olfactory lobes, from a skull of a *Periptychus* in which the teeth are preserved, and prove the species to be the *P. rhabdodon*. The olfactory lobes are enormous, and the hemispheres small and very flat. The *mesencephalon* is entirely exposed. The cerebral hemispheres are very flat, and are only differentiated from the olfactory lobes, by a moderate contraction and depression, which forms the peduncle of the latter. Only the proximal part of the olfactory lobes is preserved, but this expands so as to be only a little narrower than the hemispheres. The peduncle has a ridge on the median line, and a shallow fossa on each side of it. The lateral outlines of the hemispheres diverge, and the widest part is posterior. There is no indication of sylvian fissure. The transverse section of the hemispheres would be a flat arch, but for the presence of a longitudinal oval protuberance on each of them, which do not quite touch the median line, and which have definite boundaries. If their limits determine the size of the cerebral hemispheres, then the latter are wider



T. Sinclair & Son, Lith. Phila.

PHENACODUS PRIMAEVUS  $\times$



T. Sinclair & Son, Lith. Phila.

1. PHENACODUS PRIMAEVUS  $\frac{1}{4}$ . 2-3. PERIPTYCHUS  
RHABDODON  $\frac{1}{4}$ .

than long, but they probably pass gradually into the mesencephalon behind them. These bodies remind one of the corpora olivæformia, and may represent the superior or median frontal convolutions. They are probably, however, not to be homologized with any convolutions, representing rather the cerebral vault of the lateral ventricle. Posterior to them the flat surface descends gently without indication of copora quadrigemina or other irregularity, and at a distance about equal to the length of the oval bodies, it begins to rise gently. The cranium is broken here, and no cast of the cerebellum was obtained.

I may remark that the cranium from which this cast is taken is not crushed, and that it consists of parts of the parietal and squamosal bones only. The latter remain as far as the incurvature to the pterygoid processes in front of the glenoid cavity.

*Measurements of brain.*

M.

Length from posterior rise to base of olfactory lobes....	.037
Length of oval bodies of hemispheres.....	.018
Width of proximal part of olfactory lobes.....	.027
Width of olfactory peduncles.....	.021
Length from olfactory lobes to oval bodies of hemispheres.....	.005
Diameter of hemispheres at posterior part of oval bodies.	.038
Depth from sagittal crest to olfactory lobes.....	.024

EXPLANATION OF PLATES.

PLATE I.

Casts of the brain case of *Phenacodus primævus* Cope, natural size.

- Fig. 1. Lateral view.
- Fig. 2. Superior view.
- Fig. 3. Anterior view.
- Fig. 4. Posterior view.

PLATE II.

- Fig. 1. Brain of *Phenacodus primævus*, inferior view.
- Fig. 2. Cast of brain case of *Periptychus rhabdodon*, superior view.
- Fig. 3. Cast of brain case of *Periptychus rhabdodon*, lateral view.